Electronic Version
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Claims

[c1] 1. A sputtering apparatus, comprising:

a chamber;

a cathode installed on the top of the chamber;

a power-supplying device connected to the cathode;

a metal target installed on the cathode;

a wafer-supporting device installed in the chamber, being coaxial with and parallel to the metal target, and a wafer is held on the wafer-supporting device;

a pressure-reducing device, connected to the chamber, for supplying reaction gases to the chamber;

a temperature-controlling device, comprising:

a temperature sensor installed on an inner sidewall of the chamber for measuring a temperature of the inner sidewall of the chamber;

a temperature receiver, connected to the temperature sensor, for receiving and storing temperature data measured by the temperature sensor;

a water-cooling system, comprising:

a cooling water piping, encircling sidewalls of the chamber; and

a temperature-controlling device connected to the cooling water piping and the temperature sensor, for supply-

ing cooling water to the cooling water piping, and based on temperature signals from the temperature receiver, for controlling flow rate of the cooling water and consequently controlling the temperature of the inner sidewall of the chamber.

[c2] 2. The sputtering apparatus of claim 1, wherein a magnetron device is installed in the cathode.

[c3] 3. The sputtering apparatus of claim 1, wherein the power-supplying device comprises a high-voltage DC power-supplier.

[c4] 4. The sputtering apparatus of claim 1, wherein the temperature sensor comprises a thermal couple.

[c5] 5. A manufacturing method of metal/metal compound layer, comprising:
placing a wafer in a chamber;
forming a metal layer on the wafer;
forming a metal compound layer over the metal layer in the chamber; and
controlling a sidewall temperature of the chamber to be kept at about 50 ℃ ~ 70 ℃ during the steps of forming the metal layer and the metal compound layer.

[c6] 6. The manufacturing method of claim 5, wherein the step of forming the metal layer comprise forming a tita-

nium layer.

[c7] 7. The manufacturing method of claim 5, wherein the step of forming the metal compound layer comprise forming a titanium nitride layer.

[c8] 8. The manufacturing method of claim 5, wherein the step of forming the metal layer on the wafer comprises supplying argon to the chamber.

[c9] 9. The manufacturing method of claim 5, wherein the step of forming the metal layer on the wafer comprises performing magnetron DC sputtering.

[c10] 10. The manufacturing method of claim 5, wherein the step of forming the metal compound layer over the metal layer in the chamber comprises supplying nitrogen and argon to the chamber.

[c11] 11. The manufacturing method of claim 5, wherein the step of forming the metal compound layer over the metal layer in the chamber comprises performing reactive sputtering.

[c12] 12. The manufacturing method of claim 5, wherein the step of controlling the sidewall temperature of the chamber to be kept at about 50 ℃ ~ 70 ℃ during the steps of forming the metal layer and the metal com-

pound layer comprises:
measuring the sidewall temperature of the chamber; and controlling a flow rate of cooling water based on the sidewall temperature so as to keep the sidewall temperature of the chamber at about 50 ℃ ~ 70 ℃.

[c13] 13. A manufacturing method of titanium/titanium nitride, comprising:
placing a wafer in a chamber;
performing magnetron DC sputtering process in the chamber to form a titanium layer on the wafer;
performing reactive sputtering process in the chamber to form a titanium nitride layer over the titanium layer; and
controlling a sidewall temperature of the chamber to be kept at about 50 ℃ ~ 70 ℃ during the processes to form the titanium layer and the titanium nitride layer.

[c14] 14. The manufacturing method of claim 13, wherein the step of performing magnetron DC sputtering process in the chamber to form the titanium layer on the wafer comprises supplying argon to the chamber.

[c15] 15. The manufacturing method of claim 13, wherein the step of performing reactive sputtering process in the chamber to form the titanium compound layer over the titanium layer comprises supplying nitrogen and argon to the chamber.